

[0011] FIG. 1 illustrates an exemplary communication network 100 including infrastructure for a Code Division Multiple Access (CDMA), for example, the CDMA 2000 protocol network, and a Global System for Mobile Communications (GSM) protocol network. The exemplary infrastructure includes a GSM switch 110, for example, a Mobile Switching Center (MSC), communicably interconnecting one or more GSM base station controllers 120 to a Public Switched Telephone Network [~~network~~] (PSTN) 132. Each base station controller (BSC) 120 is communicably coupled to at least one and typically multiple GSM base transceiver stations 122. The exemplary network also includes a CDMA switch 130 communicably interconnecting one or more CDMA base station controllers 140, each of which is communicably coupled to one or more CDMA base transceiver stations 144, to the PSTN.

[0014] In FIG. 1, there is a CDMA to GSM network communication link or connection 160 for coordinating the assignment of mobile stations from one network to the other as discussed further below. In other embodiments one or both of the exemplary GSM and CDMA networks may be other networks operating pursuant to other [~~communications~~] communication protocols, for example, one of the exemplary networks may be an IS-95 CDMA network, among other networks.

[0017] According to the disclosure, more generally, while the multimode wireless communications device is operating in one communications mode in a first communications network, it generates a message including information indicating an ability of the multi-mode wireless communications device to operate in another different communications mode in a different

communications network. In some embodiments, the message indicates that the communications device has an ability to operate in a third communications mode on one of the first or second networks [network]. More specific information about the capabilities of the communication device may also be provided. Where the communications device is capable of operating in a GSM network, for example, the message may indicate whether the communications device is capable of operation in single-slot or multi-slot mode. Exemplary [message] messages are discussed further below.

[0018] In the exemplary CDMA/GSM environment of FIG. 1, while the exemplary CDMA/GSM phone 150 is operating in the CDMA communications mode connected to the CDMA network, the phone 150 generates and sends [send] to the network a message including information indicating an ability of the multi-mode wireless communications device to operate in the GSM communications mode. In embodiments where the multimode wireless communications device places or originates a call, the message is an origination message indicating that the multi-mode communications device is capable of operating in a different mode. In embodiments where the multimode communications device receives a page, the alternative operating mode information is included in a page response message. In other embodiments, this information may be included in a message other than origination and page response messages.

[0019] In one embodiment, the message includes a first additional mode information field for indicating an ability of a multimode communications device to accept a channel assignment in at least a first additional mode other than a first operating mode. In one embodiment, the first operating mode

corresponds to a communications protocol, for example, CDMA 2000, to which the message is native. In some embodiments, the message includes a second additional mode information field for indicating an ability of the multimode communications device to operate in a second additional mode other than the first mode and the first additional mode.

**[0023]** In other embodiments, other bit counts and encoding schemes may be employed for indicating alternative operating [mode] modes of a communication device in an origination message or in a page response message. Alternative embodiments may include only a single field in the origination message or the page response message for communicating information about alternative operating modes. In FIG. 3, for example, the alternative operating mode or modes may be indicated by a single field instead of using the EXT\_REQUEST\_MODE\_INCL field 308 and the EXT\_REQUEST\_MODE field 310.

**[0024]** In FIG. 2, at block 240, the network receives the message from the communications device indicating an ability of the communications device to operate in one or more different communications modes. With information about the capabilities of the communications device, the network may assign a call to a network different than the network on [t0] which the communications device is currently connected. In the exemplary scenario of FIG. 1 where the multi-mode GSM/CDMA phone 150 transmits a message to the CDMA network indicating an ability of the phone 150 to communicate on a GSM network, the CDMA network may elect to assign a call received or originated

by the phone to a GSM traffic channel. The exemplary assignment decision may be based on network load and traffic conditions, among other factors.

[0027] The network sends an assignment message to the communications device when the communications device originates a call and when the communications device responds to a page. Generally, the assignment message includes assignment information for [the] any new network to which the communications device will be assigned. In the exemplary embodiment of FIG. 2, at block 270, the CDMA network sends a channel assignment including GSM channel assignment information to the communications device. Generally, the communications device may be assigned directly to a channel on the other network or it may be assigned to an access grant channel to complete set-up on the assigned network. In FIG. 2, at block 280, the communications device receives the channel assignment message having extended assignment information [7] and the communications device acquires the channel on the newly assigned network. Exemplary channel assignment messages are discussed further below.

[0028] FIG. 5 is an exemplary channel assignment message 500 in which a communications device connected to one network, for example, the CDMA network of FIG. 1, may be assigned to another network, for example, the GSM network of FIG. 1. The exemplary channel assignment message 500 is a CDMA assignment message, which may include one [or] or more known CDMA channel assignment fields, for example, a traffic channel assignment field, 502, a paging channel assignment field 504, an acquire analog system field 506, an analog voice channel assignment field 508, among other known

fields. Channel assignment messages native to other communications protocols may include other fields.

[0030] In circumstances where the channel assignment message is in response to a page response message sent by the communications device, the channel assignment message may indicate whether the communications device should, after transferring to the new network, wait for a new page on the assigned network or re-send the page response to the assigned network without first receiving a page on the assigned network. In FIG. 6, the exemplary channel assignment message may include a respond field 602, which may include one or more bits for indicating whether the communications device should wait for a new page on the new system or network. The exemplary channel assignment fields in FIG. 6 also include GSM channel information (PCS\_BAND\_FLAG) 604 and channel assignment information (ARFCN) 606.

[0031] In some embodiments, the channel assignment message includes a voice channel assignment on another network. The exemplary channel assignment message of FIG. 5 includes a GSM voice assignment field 514. FIG. 7 illustrates [an] exemplary GSM traffic channel assignment fields that may be incorporated into the channel assignment message, including GSM channel information (PCS\_BAND\_FLAG) 702 and channel assignment information (ARFCN) 704, time slot information 706, among other known information required for a GSM channel assignment. Other protocols may require other information to effect a channel assignment. In some embodiments, the existence of the GSM voice channel assignment field 514 is used to indicate the

KRAUSE  
"Operating Mode Extensions in Wireless  
Communications Networks"  
Atty. Docket No. CS23879RA

Appl. No. 10/797,172  
Confirm No. 4057  
Examiner J. Contee  
Art Unit 3617

existence of additional voice channel assignment information in the message.  
In other embodiments, the field 514 is not used.